Climate Service Platform for Energy Application: Corporate Climate Risk or Opportunities?

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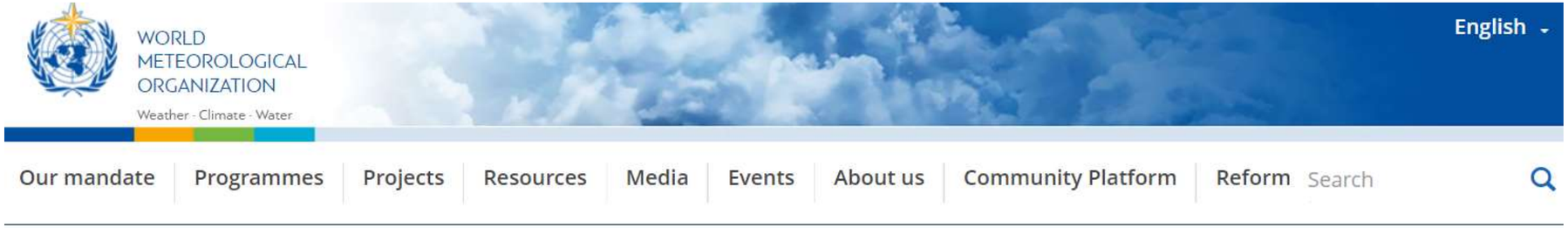
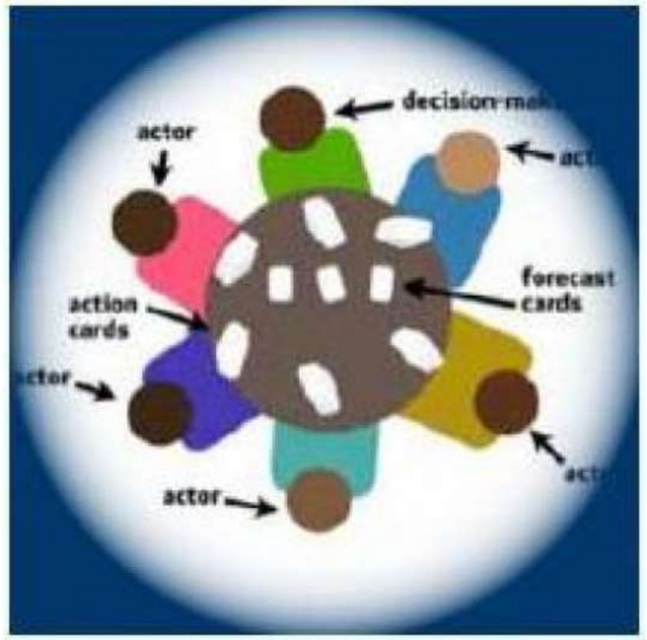
Study on Climate Change Risk Assessment for Business (CCRAB)

2023 APEC Climate Symposium and Asia Pacific Climate Services Workshop Joint Conference

A definition from WMO…





"Climate is what you expect and weather is what you get"

What are climate services?

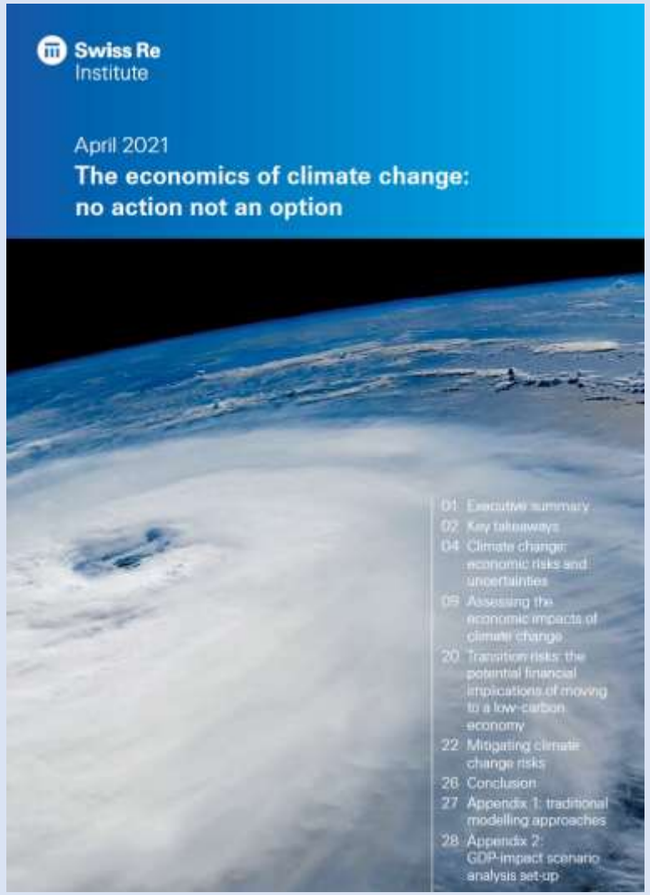
*A climate service is a decision aide derived from climate information that assists **individuals and organizations** in society to make improved ex-ante decision-making.*

*A climate service requires appropriate and iterative engagement to produce a timely advisory that **end-users** can comprehend and which can aid their decision-making and enable early action and preparedness.*

*Climate services need to be provided to **users** in a seamless manner and, most of all, need to respond to user requirements.*

https://public.wmo.int/en/bulletin/what-do-we-mean-climate-services

Severe global economic losses due to climate change



Global temperature rises will negatively impact GDP in all regions by mid-century. The current trajectory of temperature increases, assuming action with respect to climate change mitigation pledges, points to global warming of 2.0–2.6°C by mid-century. The loss in global economic value in this scenario could be up to 10% higher than if the Paris Agreement of much less than 2°C rise in temperatures is reached. Economies in southeast Asia (ASEAN) countries would be hardest hit. In a severe scenario of a 3.2°C-rise in temperatures, the global GDP loss could be as much as 14% higher than that under the Paris targets.

	Temperature rise scenario, by mid-century			
	Well-below 2°C increase	2.0°C increase	2.6°C increase	3.2°C increase
	Paris target	*The likely range of global temperature gains*		*Severe case*
Simulating for economic loss impacts from rising temperatures in % GDP, relative to a world without climate change (0°C)				
World	−4.2%	−11.0%	−13.9%	−18.1%
OECD	−3.1%	−7.6%	−8.1%	−10.6%
North America	−3.1%	−6.9%	−7.4%	−9.5%
South America	−4.1%	−10.8%	−13.0%	−17.0%
Europe	−2.8%	−7.7%	−8.0%	−10.5%
Middle East & Africa	−4.7%	−14.0%	−21.5%	−27.6%
Asia	−5.5%	−14.9%	−20.4%	−26.5%
Advanced Asia	−3.3%	−9.5%	−11.7%	−15.4%
ASEAN	−4.2%	−17.0%	−29.0%	−37.4%
Oceania	−4.3%	−11.2%	−12.3%	−16.3%

Note: Temperature increases are from pre-in temperatures to emissions) from left to right.
Source: Swiss Re Institute

As the world heats up, GDP will show negative growth, and the worst is in Asia

Aon: $343 Billion in Global Weather-, Catastrophe-Related Economic Losses Reported in 2021, Up From $297 Billion in 2020

USA - English

AON

NEWS PROVIDED BY
Aon plc →
Jan 25, 2022, 09:00 ET

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Report shows only 38 percent of natural peril losses were covered by insurance, an improvement from last year

CHICAGO, Jan. 25, 2022 /PRNewswire/ -- Aon plc (NYSE: AON), a leading global professional services firm, today published its 2021 Weather, Climate and Catastrophe Insight report, which evaluates the increasing frequency and severity of disruptive natural disasters and how their resulting economic losses are protected g
the foundation for insights that can help business leaders quantify and qualify catastrophe-re
their organizations can increase resilience amid an increasingly volatile climate.

Economic losses from climate-related disasters are on the rise globally, but only 38% of losses are currently covered by insurance

Source: https://www.prnewswire.com/news-releases/aon-343-billion-in-global-weather--catastrophe-related-economic-losses-reported-in-2021-up-from-297-billion-in-2020-301467627.html

The Washington Post
Democracy Dies in Darkness

ECONOMY

Home insurers cut natural disasters from policies as climate risks grow

Some of the largest U.S. insurance companies say extreme weather has led them to end certain coverages, exclude natural disaster protections and raise premiums

By Jacob Bogage

September 3, 2023 at 7:30 a.m. EDT

In the aftermath of extreme weather events, major insurers are increasingly no longer offering coverage that homeowners in areas vulnerable to those disasters need most.

At least five large U.S. property insurers — including Allstate, American Family, Nationwide, Erie Insurance Group and Berkshire Hathaway — have told regulators that extreme weather patterns caused by climate change have led them to stop writing coverages in some regions, exclude protections from various weather events and raise monthly premiums and deductibles.

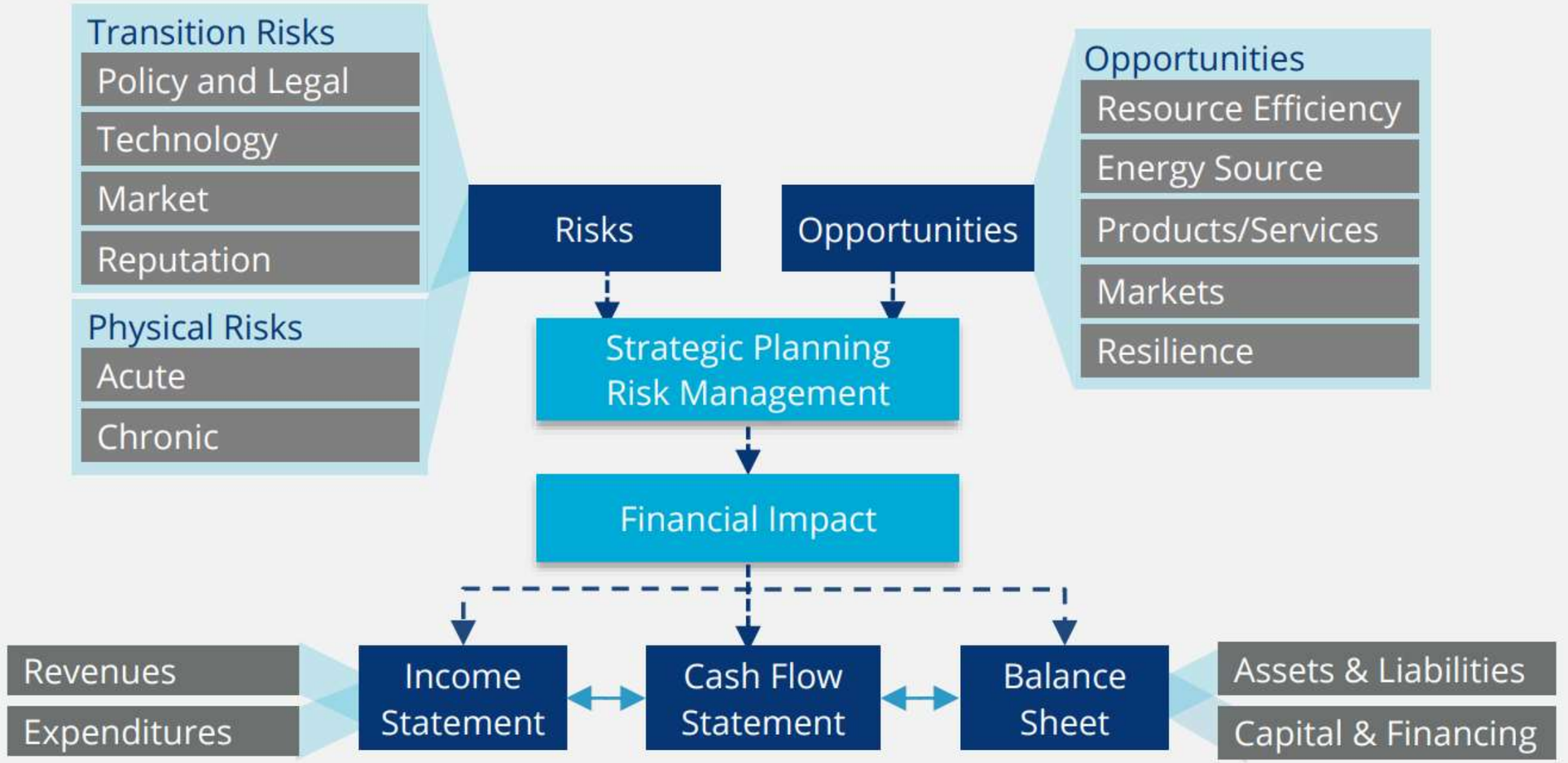
- **What climate risks will businesses face in the future?**
- **What (or how much) are possible losses? Who needs to bear?**
- **Is the insurance company willing to cover it?**
- **Is the bank willing to lend money?**
- **How much risk is there for the financial industry?**

→ **TCFD**

TCFD: Task Force on Climate-Related Financial Disclosures

TCFD Framework

Climate-Related Risks, Opportunities, and Financial Impact



Study on Climate Change Risk Assessment for Business (CCRAB) is a project driven by stakeholders

Origin

Finance/Investment/Corporate

International trends

2000 CDP

2015 TCFD

FSC policy

Domestic trends

2013 2013 National Blueprint for Corporate Governance Strengthening

2018 New Blueprint for Corporate Governance 2018 - 2020

2020
- Green Finance Action Plan 2.0
- Corporate Governance 3.0 - Blueprint for Sustainable Development

Businesses need to disclose climate-related financial information to help investors, lenders and insurers understand significant risks. However, the current climate data/information cannot satisfy Taiwanese enterprises.

- Foreign data/info: expensive, low resolution
- Domestic data/info: insufficient information on climate risks

Domestic financial industry:
How to do it?
Who can help us?

C-Crabs

Climate-Related Risks, Opportunities, and Financial Impact

Transition Risks
- Policy and Legal
- Technology
- Market
- Reputation

Physical Risks
- Acute
- Chronic

At least provide RISK INFORMATION first

Risks

Opportunities

Opportunities
- Resource Efficiency
- Energy Source
- Products/Services
- Markets
- Resilience

Green energy?

Strategic Planning
Risk Management

Financial Impact

Revenues
Expenditures

Income Statement

Cash Flow Statement

Balance Sheet

Assets & Liabilities
Capital & Financing

CCRAB Overview

Aims

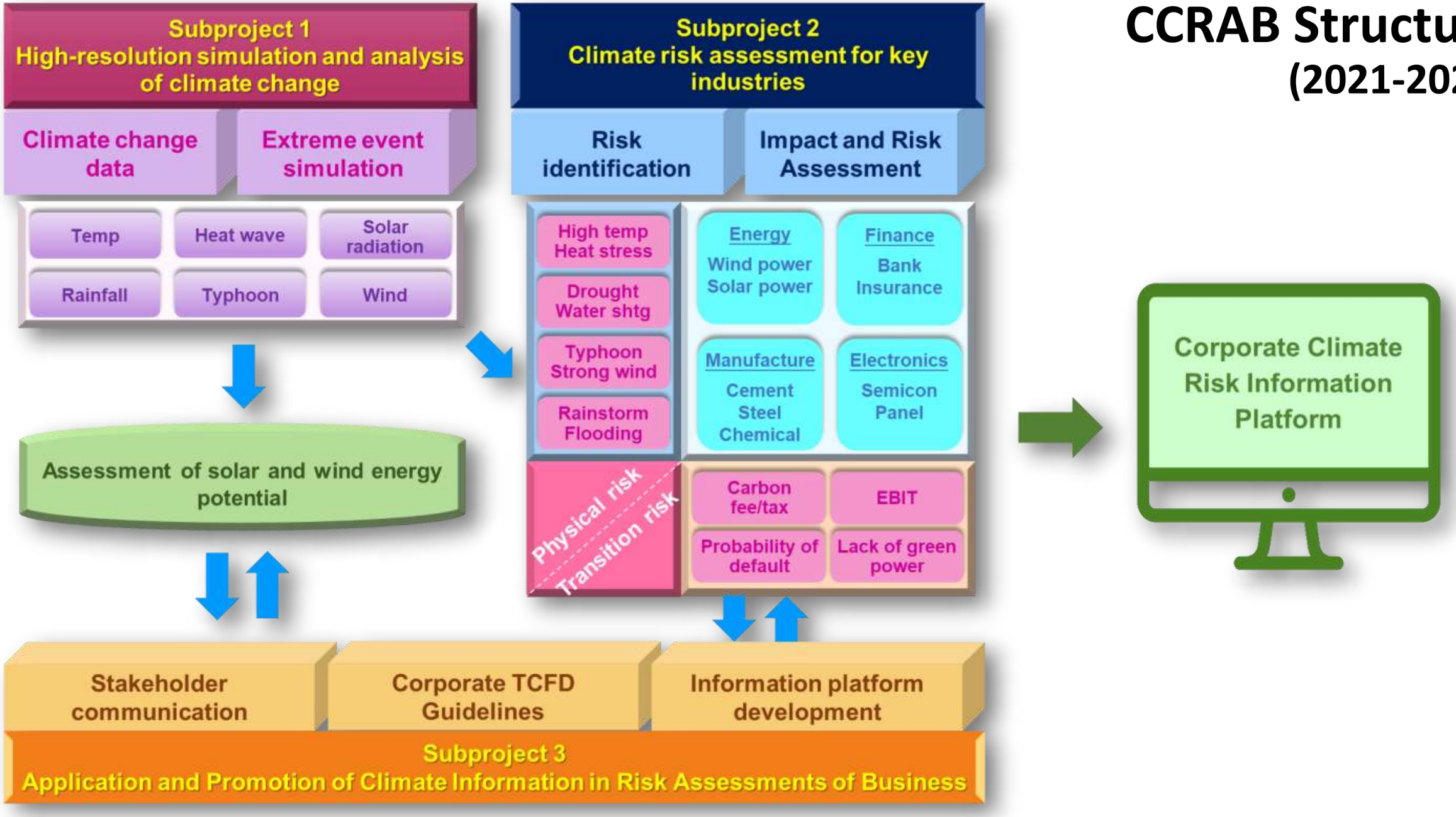
- Use high-resolution climate change data to build risk assessment data for Taiwanese companies
- Construct an open information platform for industrial climate change risk assessment
- The results can serve as a scientific basis for Taiwanese companies to disclose climate-related financial risks

◆Sub-aim: Use high-resolution climate change data to evaluate the potential of wind and solar energy in Taiwan

Features

- Stakeholder-oriented project, which is closely linked with stakeholders
- Linking science and application, transdisciplinary integration of academic research and practice
- Industry-university-research consultants meeting

CCRAB Structure (2021-2023)

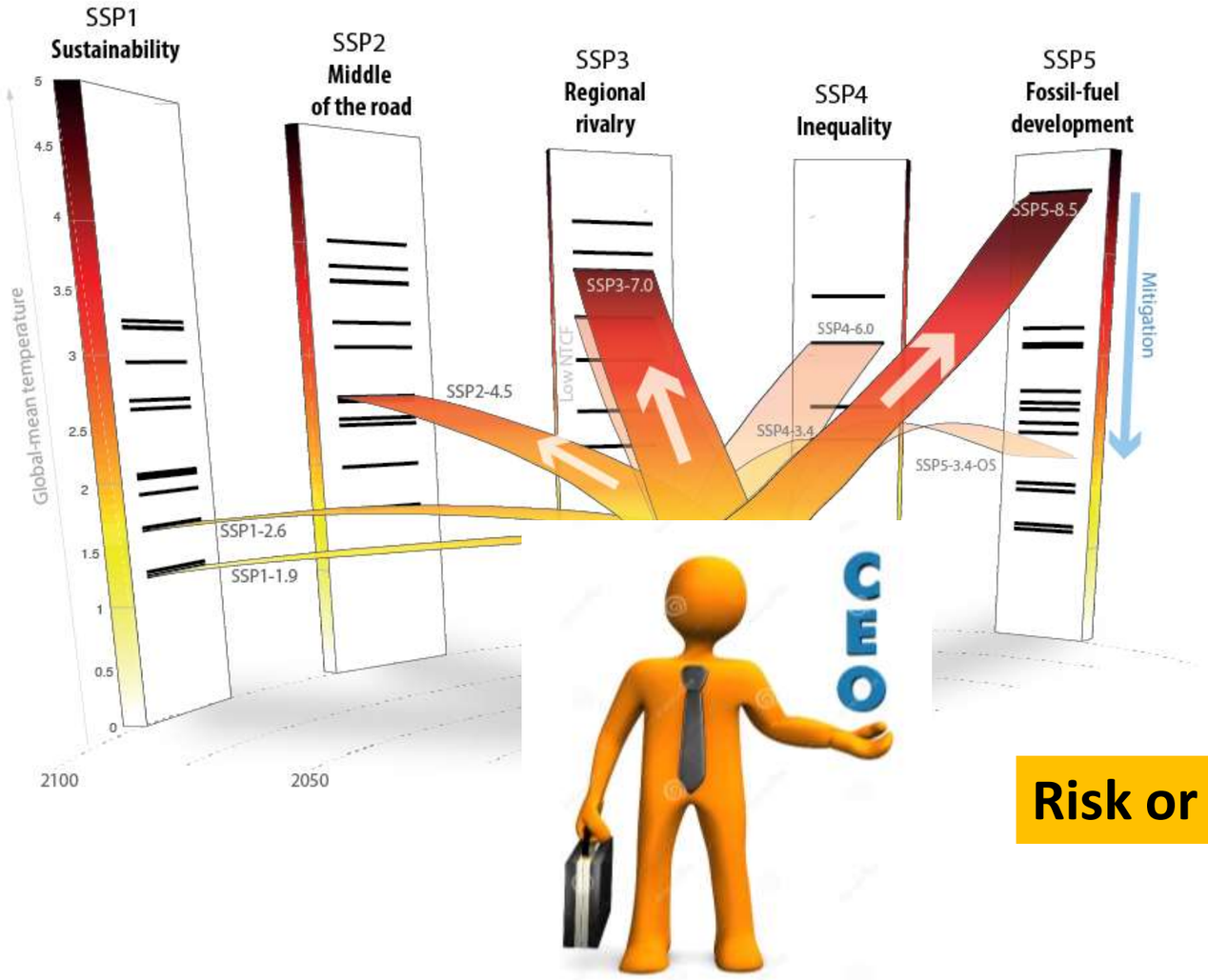


When corporates face climate change scenarios…

SSP1-1.9
Low-emission/Net Zero Scenario

SSP5-8.5
High-emission Scenario

- **High transition risk**



- **High physical risk**

Risk or Opportunity?

2021 TCFD Report

Examples of Climate-related Physical Risks

Climate Variable	Potential Change	Affected Assets	Risk or Opportunity	Physical Impact	Operational Impact
Temperature	Hotter temperatures	All	Risk	Equipment ratings and throughput can be temperature dependent (conductors, transformers, batteries, gear box, etc.); water used for cooling may be too warm	Components may not be able to operate to design basis and need to be replaced. If incoming water temperature gets too high, it can result in reduced cooling water efficiency and reductions in steam-electric generation.
	Increased summer heat	All	Opportunity	Increased summer heat increases demand for electricity	Increased top line revenue
Precipitation	Increased precipitation (rain)	All	Risk	Flooding	Disrupt operation of substation facilities, offices, service centers
Severe Weather	Increased, more intense storms	All	Risk	Severe weather can damage equipment	Outages; storm-related costs; customer experience; cascading impacts from economic disruption caused by reduced demand from severe weather
Sea Level Rise	Sea level rise	T&D	Risk	Flooding and expansion of storm surge zones could severely damage facilities.	Loss of and/or need to relocate facilities, staging areas
Wind	Extreme wind activity	All	Risk	Extreme winds could damage infrastructure and increase debris	Power outages; cost to repair/replace infrastructure
	Increased wind speeds	Wind	Opportunity	Increase in renewable resource	Increased power output from wind

CCRAB begins with stakeholder communication

Stakeholder interviews and forums

Electronics	Manufacturing	Energy	Finance	Others
• DELTA • TSMC • ASE	• Yieh Phui • Tung Ho Steel • Simplo • Chicony • CSC • USI • Manufacturing forum	• Solar energy forum • Wind energy forum	• Cathay Financial Holdings • CTBC Holding • BAROC, JCIC and Formosa Climate Smart Service	• BOE • TSIA and TPSA • Taipower (Request for information) • CNFI • PwC Taiwan • FSC • CIER

- **Over 20 interviews**
- **3 forums**

CCRAB begins with stakeholder communication

「氣候變遷企業轉型，風險or機會？」系列論壇

氣候變遷情境下太陽光電之潛能與風險評估

2021.11.22 (一) 9:00-12:20

中研院環境變遷研究大樓
1樓演講廳

議程

09:00 - 09:30	報到	
09:30 - 09:35	主席致詞	許晃雄 執行長/計畫總主持人
09:35 - 09:55	專題報告 1	林福銘 組長 ✓ 講題：太陽光電技術發展與潛能分析
09:55 - 10:15	專題報告 2	王朋泰 維運總監 ✓ 講題：大型光電維運的極端氣候挑戰
10:15 - 10:35	專題報告 3	李威良 副研究員 ✓ 講題：由高解析度氣象資料估算太陽光電潛勢的空間分布
10:35 - 10:50	休息	
10:50 - 12:20	綜合座談	主持人 許晃雄 執行長/計畫總主持人 與談人 林文信 組長 楊宏澤 特聘教授 蔡宗融 理事長 林福銘 組長 王朋泰 維運總監 李威良 副研究員
12:20 -	散會	

執行計畫：中研院永續科學計畫-產業氣候變遷風險評估研究(2021-2023)
主辦單位：中研院環境變遷研究中心　　協辦單位：經濟部能源局

ITRI

Corporates

CCRAB

BOE

Academia

Industry associations

「氣候變遷企業轉型，風險or機會？」系列論壇

氣候變遷情境下臺灣風力發電之潛能與風險評估

2021.11.26 (五) 9:00-12:20

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1樓演講廳

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09:55 - 10:15	專題報告 2	林世豪 總監 ✓ 講題：風力發電面對氣候變遷的挑戰
10:15 - 10:35	專題報告 3	杜佳穎 研究副技師 ✓ 講題：氣候變遷情境下台灣風力發電之潛能與風險
10:35 - 10:50	休息	
10:50 - 12:20	綜合座談	主持人 許晃雄 執行長/計畫總主持人 與談人 陳崇憲 組長 趙修武 教授 呂威賢 秘書長 林世豪 總監 杜佳穎 研究副技師
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CCRAB begins with stakeholder communication

Feedback from stakeholders

- **Physical risk assessment**
  - Need more and higher-resolution physical risk assessment information
  - Need quantitative forecast information for the next 5-10 years
  - Multiple scenario analysis results required
  - Raw data required
  - Need an easy-to-use graphic information query tool
- **Transition risk assessment**
  - Transition risk has greater impact, but companies are not familiar with transition risk assessment

➔ Indicators can be added such as wet bulb temperature

➔ RCP/SSP and PGW scenarios can be presented

➔ Expected public information

➔ Enterprise self-assessment module will be developed

➔ Transformation risk indicators will be developed

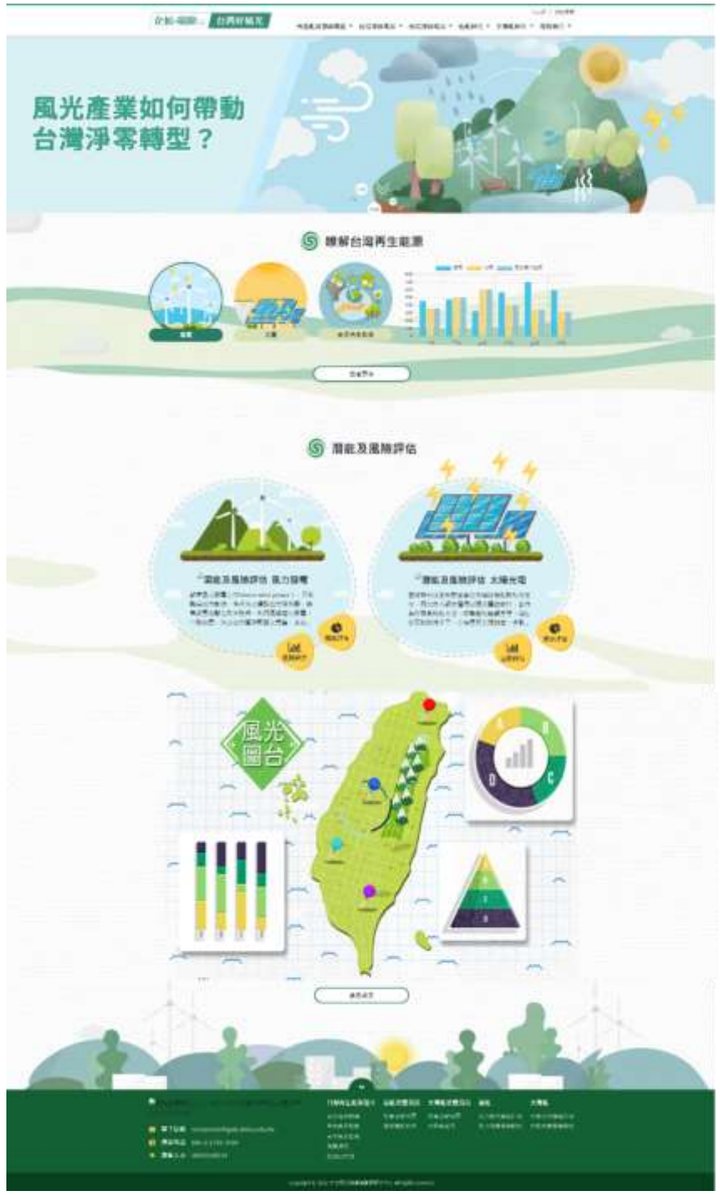
➔ It is not recommended that companies use short-term data to interpret the impact of climate change

CCRAB develops Corporate Climate Carbon Risk Platform

Launching soon

TCFD

Solar/Wind



TCFD Supporters

企候·碳險Risk 企業好風評

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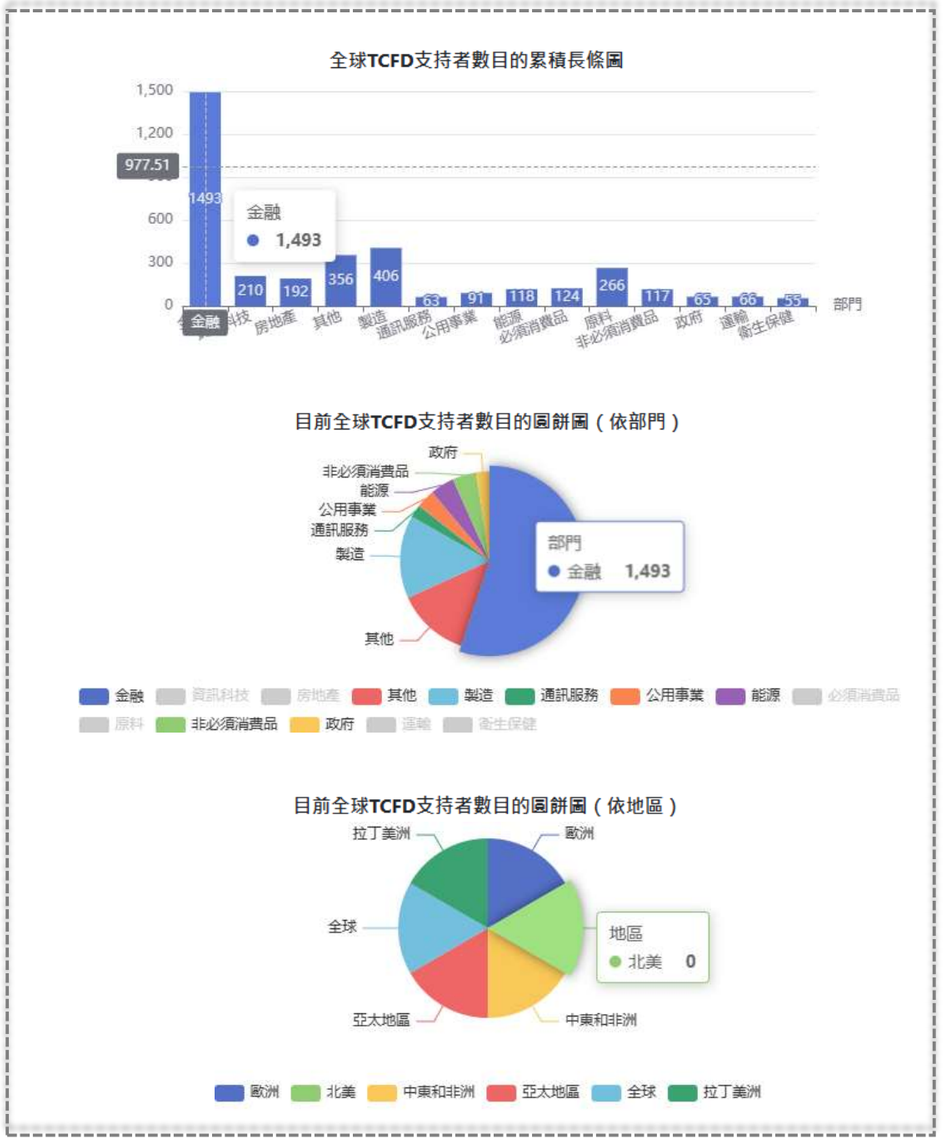

Corporate Climate Physical Risks (example: high temperature)

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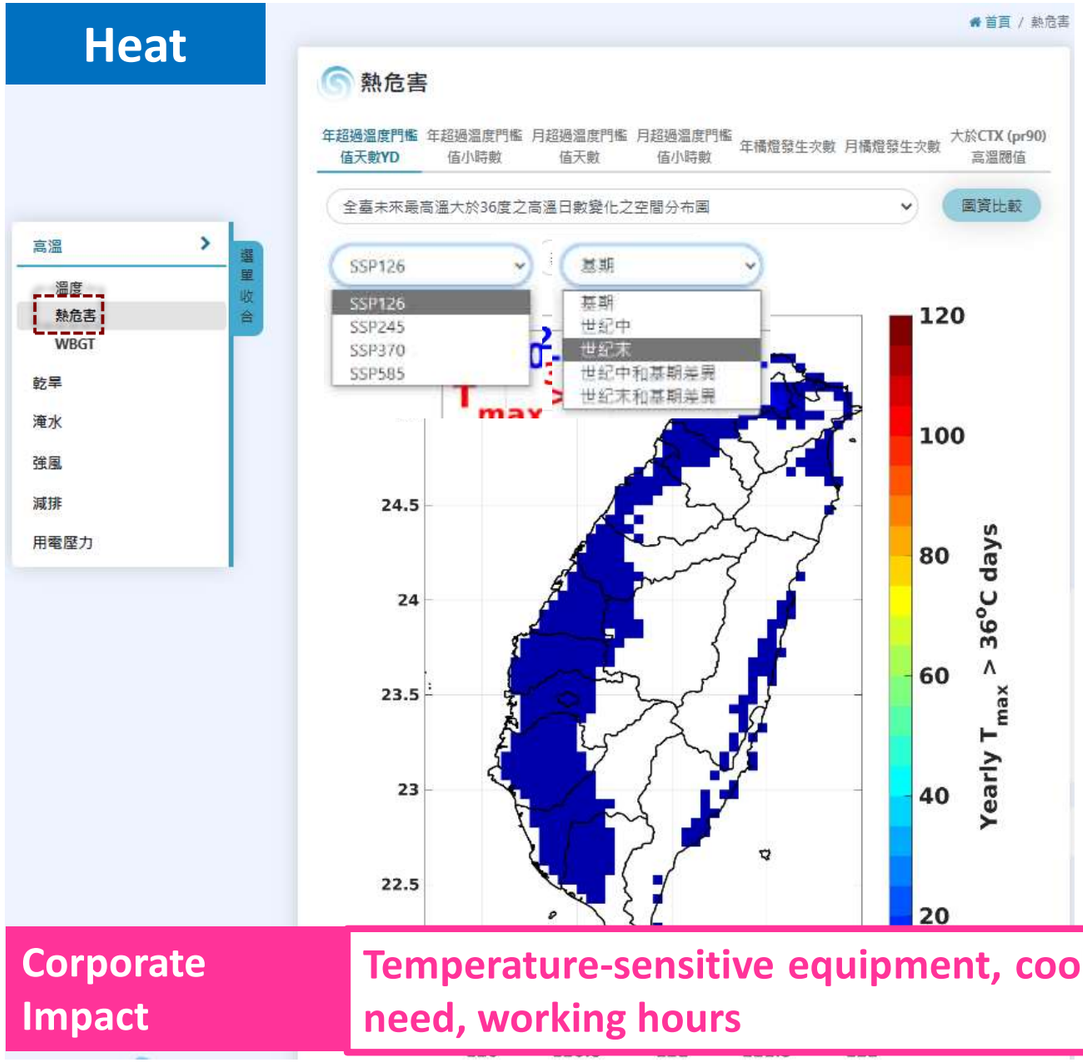
最新消息 TCFD 簡介 風險辨識 風險評估 風險管理與揭露 進階工具與資源

Heat



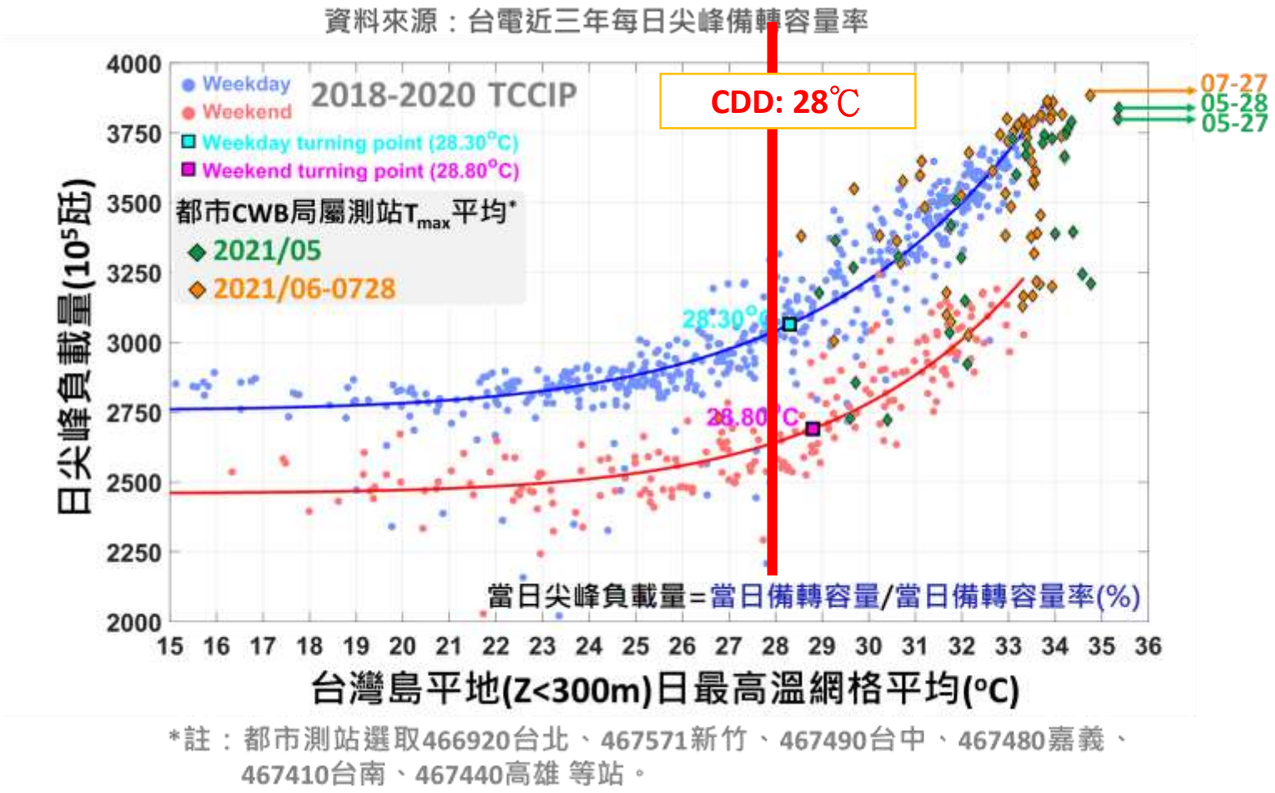
WBGT

Corporate Impact

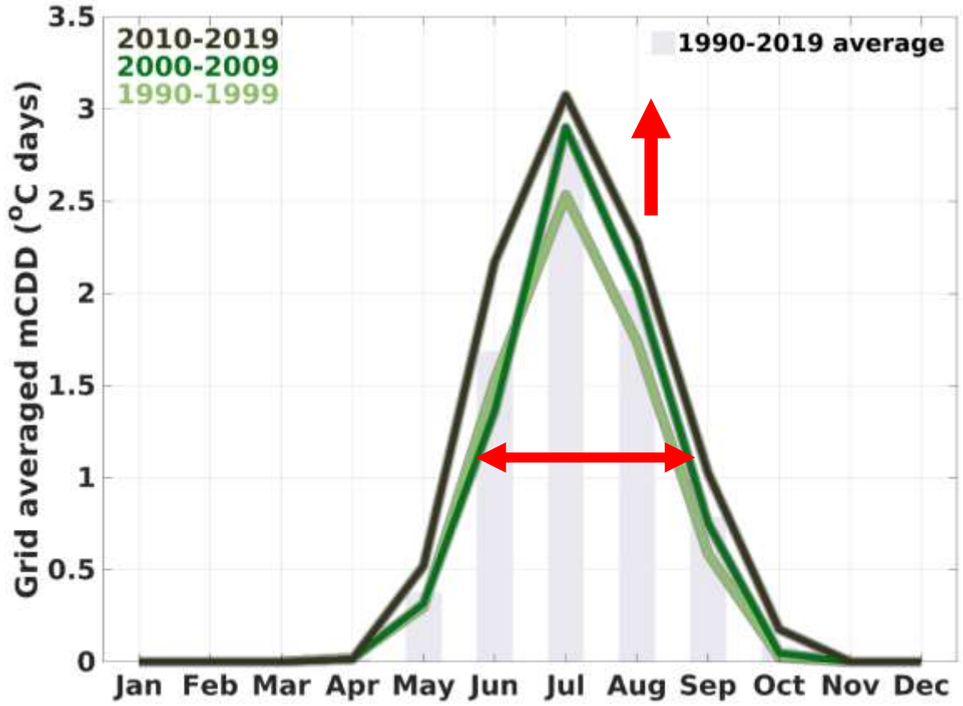
Temperature-sensitive equipment, cooling need, working hours

Corporate Climate Transition Risks (example: Energy need)

The number of days when the AC is turned on may increase in the future



*註：都市測站選取466920台北、467571新竹、467490台中、467480嘉義、467410台南、467440高雄 等站。



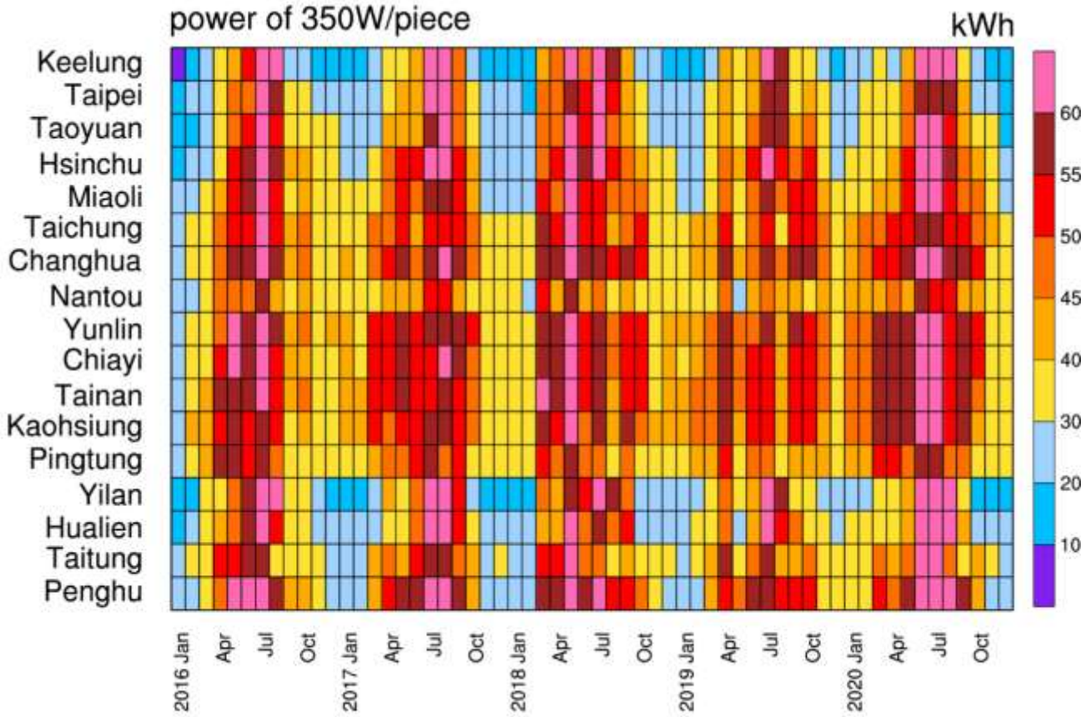
Cooling-degree day, CDD

Corporate Impact	Impact of increased electricity consumption

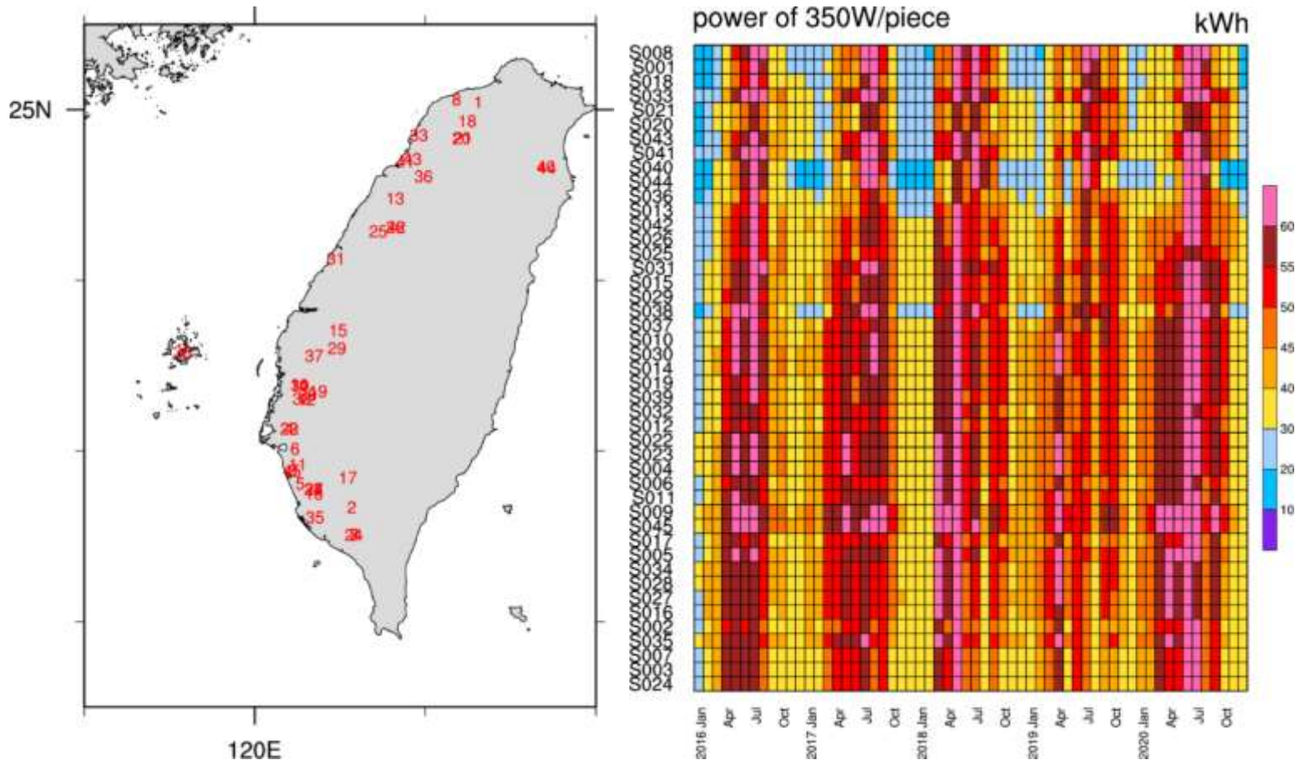
Corporate Climate Opportunities (example: Solar Energy)

Stakeholders provide on-site data to verify simulation

Himawari 350W solar panel

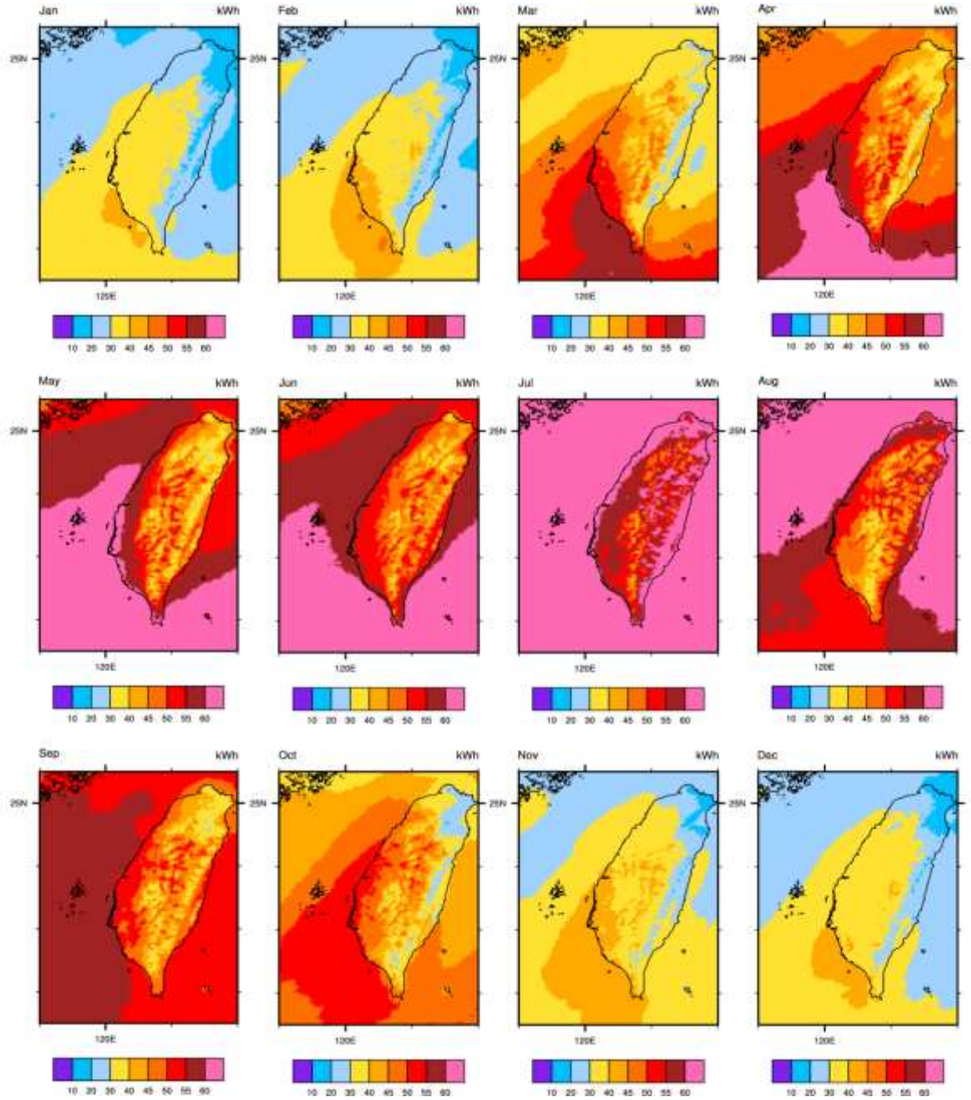


Sunnyfounder solar site



Corporate Climate Opportunities (example: Solar Energy)

Average electricity generation by month from 2016-2020



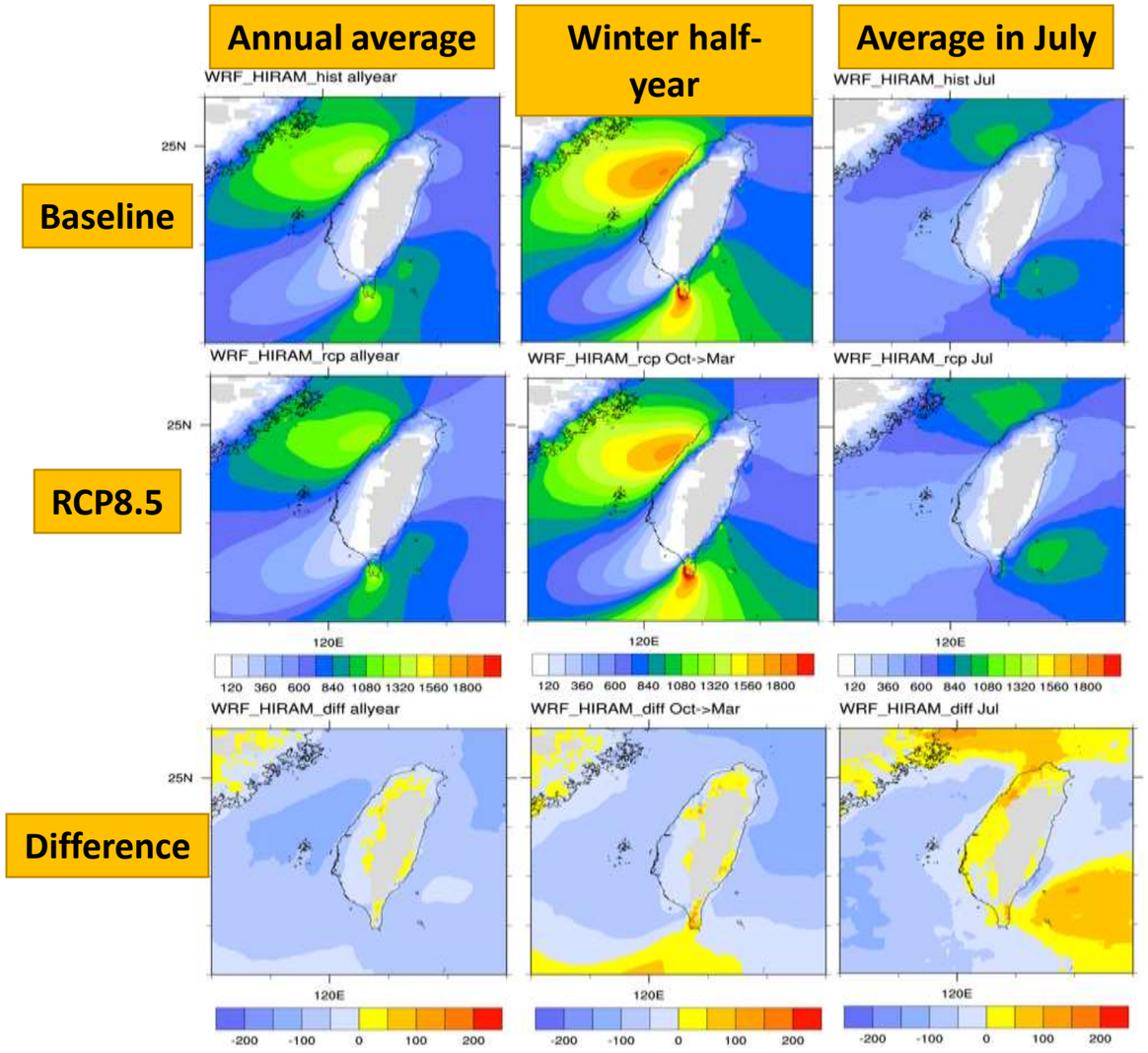
- In western Taiwan, the area south of Hsinchu and Miaoli has good power generation throughout the year
- Affected by the southwest monsoon or afternoon thunderstorms, the power generation in the southwestern region will be slightly lower than that in the central region

Corporate Climate Opportunities (example: Wind Energy)

Future wind power density assessment

- Compared with the whole year, the power generation efficiency in the winter half-year will be more than 40% higher
- The wind potential in Pingtung is also good
- Under the extreme warming scenario (RCP8.5), wind potential in the west coast of Taiwan will decline slightly in the future, but not significantly.

Wind power density (W/m^2)



Wind

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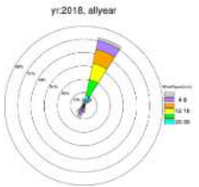
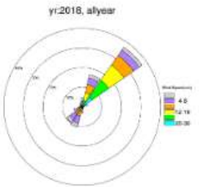
近、離岸風場時間 2018 全年

離岸風場 | 近岸風場

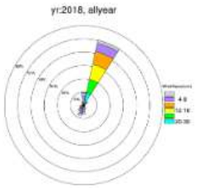
A區 2018 全年



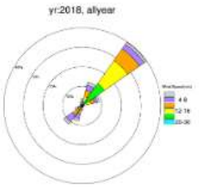
F區 2018 全年

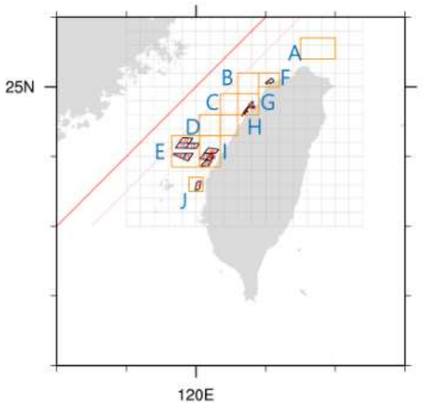


B區 2018 全年



G區 2018 全年





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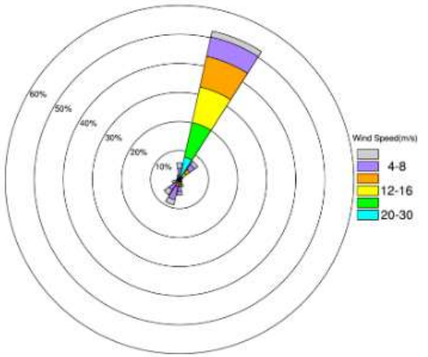

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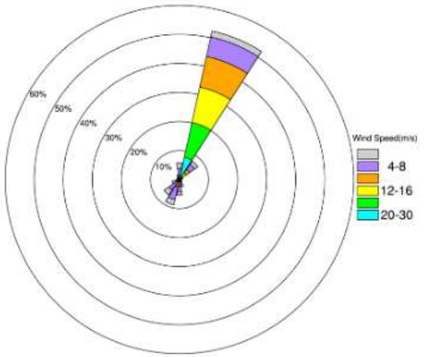

Solar

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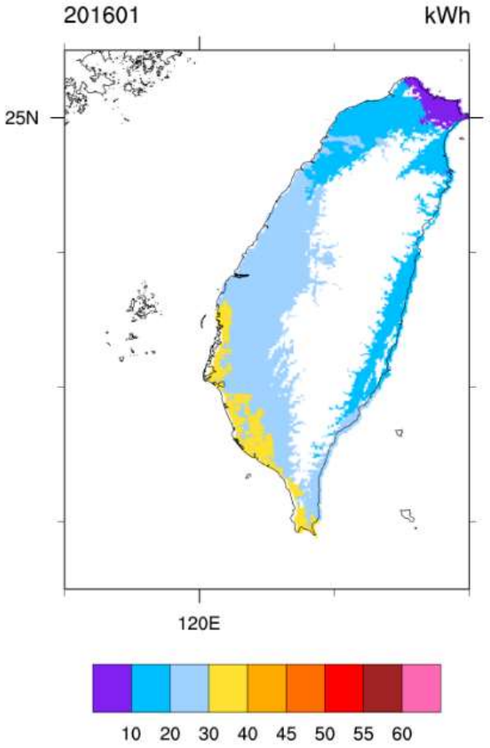
- 發電量
- 風險評估

選單收合

發電量

不同規格太陽能板發電量 | 圖資比較 | 研究方法

350W 2016 1月



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發電量

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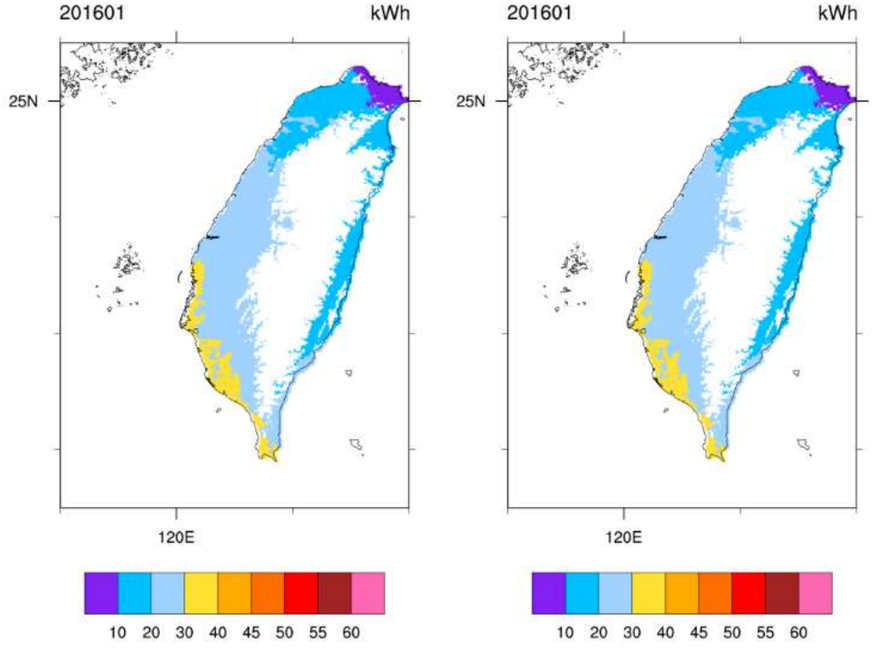
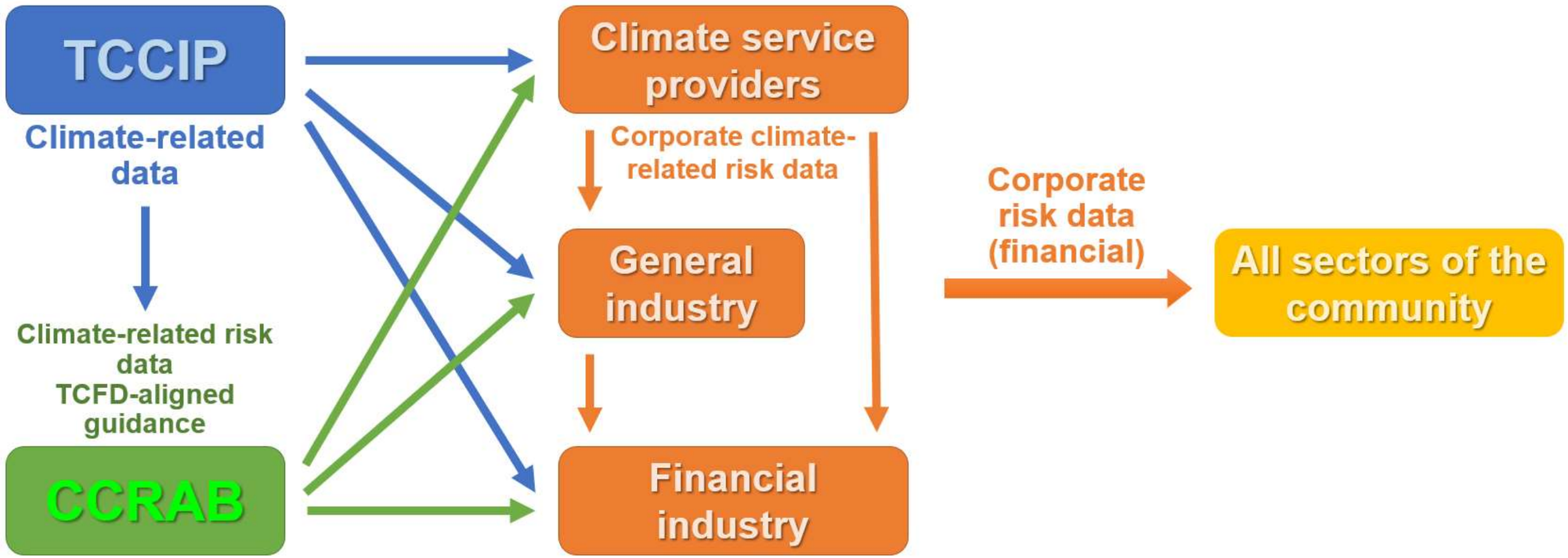


Corporate climate service ecosystem in Taiwan

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中央研究院永續科學研究計畫（2021 - 2023）

「產業氣候變遷風險評估研究」計畫

Study on Climate Change Risk Assessment for Business, CCRAB

補助單位 中央研究院 ACADEMIA SINICA

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